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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/654,093	08/31/2000	Randhir P.S. Thakur	94-0302.02	5663

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EXAMINER

BROCK II, PAUL E

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 02/01/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/654,093

Applicant(s)

THAKUR ET AL.

Examiner

Paul E Brock II

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 09 January 2002.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 52-64 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 52-64 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 August 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. The term "generally" in claim 60 is a relative term which renders the claim indefinite.

The term "generally" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. It is not clear how insulative, conductive or laterally coextensive anything preceded by the term "generally" is in this claim (i.e. "generally insulative material", "generally conductive element", "generally laterally coextensive"). Does generally laterally coextensive mean that the generally conductive element is laterally coextensive for the entire length of the generally insulative material, or is the generally conductive element only laterally coextensive with a portion of the length of the generally insulative material.

***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

*Claim Rejections - 35 USC § 103*

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claim 52 is rejected under 35 U.S.C. 103(a) as being unpatentable over Doan et al. (USPAT 5372974, Doan) in view of Boland et al. (USPAT 5084407, Boland).

Doan discloses a method of processing a semiconductor device in figure 2.

With regard to claim 52, Doan discloses in figure 6 depositing a dielectric layer (50) over a semiconductor substrate. It is inherent in Doan that electrically chargeable particles are allowed to occur in the dielectric layer, because the dielectric layer is TEOS as stated in column 4, line 43. It is inherent in the dielectric layer that some diffusion of the electrically chargeable particles are allowed, because the dielectric layer is TEOS. It is inherent in Doan that the silicon nitride layer (40) prevents at least some of the electrically chargeable particles from reaching the substrate. Doan does not disclose that the substrate comprises a plurality of electrically conductive regions and an electrically insulative region therebetween. Boland discloses in figure 2 a substrate that comprises a plurality of electrically conductive regions (22) and an electrically insulative region (12) therebetween. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the substrate of Boland in the method of Doan in order to provide a planar surface of isolated areas and active areas as stated in the abstract of Boland.

6. Claims 53 – 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Doan in view of Cunningham et al. (USPAT 5468689, Cunningham).

With regard to claim 53, Doan discloses in figure 6 depositing a dielectric layer (50) over a semiconductor substrate, wherein it is inherent feature in the method of Doan that the step of depositing a dielectric layer of TEOS comprises depositing a dielectric layer using an organic precursor. It is inherent in Doan that electrically chargeable particles are allowed to occur in the dielectric layer, because the dielectric layer is TEOS as stated in column 4, line 43, wherein it is inherent feature at the molecular level in the method of Doan that allowing electrically chargeable particles to occur in the dielectric layer comprises allowing an organic component of the organic precursor to deposit in the dielectric layer. It is inherent in the dielectric layer that some diffusion of the electrically chargeable particles are allowed, because the dielectric layer is TEOS. It is inherent in Doan that the silicon nitride layer (40) prevents at least some of the electrically chargeable particles from reaching the substrate, wherein the preventing step comprises layering a barrier of silicon nitride over the substrate using plasma processing prior to the step of depositing a dielectric layer. Doan is silent in teaching that the barrier is deposited using a non-organic precursor. Cunningham teaches in the abstract depositing a layer of silicon nitride using a non-organic precursor. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the non-organic precursor process of Cunningham in the method of Doan in order to form a barrier layer that can withstand oxide desorption at temperatures in excess of 900 degrees Centigrade as taught by Cunningham in column 1, lines 44 – 45.

With regard to claim 54, Cunningham discloses in the abstract that the plasma processing layering step comprises layering a barrier using silane.

With regard to claim 55, Doan discloses a method of at least partially forming a circuit device in figures 4 – 6. Doan discloses providing a semiconductor substrate in figure 4. Doan discloses layering a barrier on the substrate. Doan discloses layering a carbon-containing dielectric layer on the barrier. Doan does not disclose that the barrier is carbon-free.

Cunningham teaches a method of layering a carbon-free barrier on a substrate in the abstract. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the carbon-free barrier method of Cunningham in the method of Doan in order to form a barrier layer that can withstand oxide desorption at temperatures in excess of 900 degrees Centigrade as taught by Cunningham in column 1, lines 44 – 45.

With regard to claim 56, Cunningham discloses in the abstract that the step of layering a carbon-free barrier on the substrate further comprises layering the carbon-free barrier using a plasma.

With regard to claim 57, Doan discloses further comprising a step of heating the carbon-containing dielectric in column 4, lines 44 and 45.

7. Claims 58 and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Doan and Cunningham as applied to claims 55 – 57 above, and further in view of Ying (USPAT 5384288).

With regard to claim 58, Doan and Cunningham is silent to the teaching the step of heating the carbon-containing dielectric comprises raising a temperature to a range of 850C –

1050C for at least 5 seconds. Ying teaches in column 4, lines 18 – 22 the step of heating a carbon-containing dielectric comprising raising a temperature to a range of 850C – 1050C for at least 5 seconds. While Ying teaches a few seconds and not directly at least 5 seconds it would be apparent to the skilled artisan that at least 5 seconds in the rapid thermal anneal environment of Ying would result in a sufficient anneal. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the rapid thermal anneal of Ying in the method of Doan and Cunningham in order to reflow the carbon containing dielectric layer as stated by Ying in column 4, lines 18 – 22.

With regard to claim 59, Doan and Cunningham do not directly disclose the step of heating the carbon-containing dielectric comprises raising a temperature to a range of a range of 750C-1000C for at least 5 minutes. Ying teaches in column 4, lines 18 – 22 the step of heating a carbon-containing dielectric comprising raising a temperature to a range of 750C-1000C for at least 5 minutes. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the steam ambient anneal of Ying in the method of Doan and Cunningham in order to reflow the carbon containing dielectric layer as stated by Ying in column 4, lines 18 – 22.

8. Claims 60, 61, 63 and 64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Doan in view of Ghezzi et al. (USPAT 5132239, Ghezzi).

Doan discloses a method of processing a substrate in figures 4 – 6. Doan discloses in figure 5 depositing an oxide charge barrier over the substrate (silicon nitride). Doan discloses in figure 6 depositing a generally insulative material (TEOS) over the oxide charge barrier, wherein

the generally insulative material is less insulative than the barrier. Doan does not disclose a substrate comprising two active areas and an intervening insulating region, and providing a generally conductive element. Ghezzi teaches in figure 3 a substrate (2) comprising two active areas and an intervening insulating region and providing a generally conductive element (5) over a generally insulative material (21), wherein the element is generally laterally coextensive with the intervening insulating region. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the active areas and generally conductive element of Ghezzi in the process of Doan in order to form a floating gate as stated by Ghezzi in column 3, lines 31 – 40.

With regard to claim 61, Doan discloses in column 4, line 43 the step of depositing a generally insulative material comprises depositing a generally insulative material that is allowed to comprise oxide charges.

With regard to claim 63, Doan discloses in column 4, lines 44 and 45 annealing the generally insulative material. It is an inherent property of the generally insulative material, because the generally insulative material is TEOS as stated in column 4, line 43, that an oxide charge is allowed to migrate toward the substrate in response to the annealing step. It is an inherent property of the oxide charge barrier, because the oxide charge barrier is silicon nitride as stated in column 4, line 19, to intercept the oxide charge before the oxide charge reaches the surface.

With regard to claim 64, Doan discloses in figure 6 refraining from depositing any generally conductive material before the step of depositing a generally insulative material.



9. Claim 62 is rejected under 35 U.S.C. 103(a) as being unpatentable over Doan and Ghezzi as applied to claim 60 above, and further in view of Van Der Scheer et al. (USPAT 4976856, Van Der Scheer)

Doan and Ghezzi are silent in the teaching plasma treating the substrate. Van Der Scheer teaches in column 1, lines 28 – 32 plasma treating a substrate. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the plasma treating method of Van Der Scheer to treat the substrate in the method of Doan and Ghezzi in order for the preparation of non-porous (i.e. dense) selective top layers of composite multi-layer membranes as stated by Van Der Scheer in column 1, lines 14 – 19.

#### *Response to Arguments*

10. Applicant's arguments filed January 9, 2002 have been fully considered but they are not persuasive.

11. Regarding the section 112 rejections and the term “generally”. While the Applicant has provided examples of what insulative, conductive and laterally coextensive are in the specification, it is not assumed that generally insulative, generally conductive or generally laterally coextensive are the same as those terms defined in the specification and therefore the use of these phrases in the claims render the claims indefinite.

12. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on

obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

13. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

14. With respect to the applicant's arguments against the combination of Doan with Cunningham. The only teaching that the examiner has gleaned from Cunningham is a method of forming a nitride layer using a non-organic precursor.

15. With regard to the applicant's arguments against the combination of Doan and Cunningham with Ying. The only teaching that the examiner has gleaned from Ying is a specific method of heating a carbon-containing dielectric.

### *Conclusion*

16. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

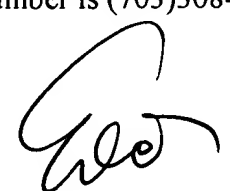
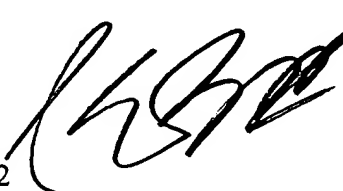
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul E Brock II whose telephone number is (703)308-6236. The examiner can normally be reached on 8:30 AM-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703)308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703)308-7722 for regular communications and (703)308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

Paul E Brock II  
January 28, 2002



EDDIE LEE  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2815